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ABSTRACT

These four papers are from a symposium on evaluating the impact of human resource development (HRD). "Pre-Job Training and the Earnings of High-Tech Employees in Taiwan" (Tung-Chun Huang) reports on a study that concludes that public training programs have no impact on participants' earnings in later jobs, but participation in private training programs does have a significantly positive effect on post-job earnings. "Training Effectiveness and Employee Output--A Regression Model Based on Training Transfer and Organization Development Variables" (Constantine Kontoghiorghes) discusses a study of the extent to which an organization benefits from its training investments, which found that stakeholder involvement, person analysis, and the training transfer climate were the most important predictors of employee output. "Only Time Will Tell: Strengthening the Link Between HRD and Firm Performance" (Laurie J. Bassi, Mark E. Van Buren) reports cross-sectional analyses of second-round data on training investments, practices, and outcomes that point to a link between investments in human capital and organizational measures of performance; longitudinal analyses strengthen this finding by demonstrating that 1996 human capital investments predict 1997 organizational performance. "Contemporary Approaches to Return on Investment (ROI) from Training" (Paul E. Brauchle, William H. Koenecke) describes methods of assessing behavior change and the value of that change and describes methods of calculating and using ROI. (YLB)

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ED 431 954

22 **Evaluating the Impact of Human Resource Development**

Chair: Tim L. Wentling, University of Illinois at Urbana/Champaign

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Tung-Chun Huang, National Central University, Taiwan

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Constantine Kontoghiorghes, Oakland University

22-3 Only Time Will Tell: Strengthening the Link Between HRD and Firm Performance

Laurie J. Bassi, American Society for Training and Development

Mark E. Van Buren, American Society for Training and Development

22-4 Contemporary Approaches to Return On Investment from Training

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Pre-Job Training and the Earnings of High-Tech Employees in Taiwan

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National Central University

The principal aim of this paper is to measure the impact of pre-job training programs on the subsequent earnings of trainees, with special attention given to engineers employed by high-tech firms in Taiwan. With the effects of educational attainment, age, and seniority controlled for, this study concludes that public training programs have no impact on the earnings of participants in later jobs. However, it finds that participation in private training programs does have a significantly positive effect on post-job earnings. A comparison between this study and others is made, and implications are briefly discussed.

Keywords: Pre-Job Training, Earnings, Taiwan

It is commonly believed that education and job training have a profound impact on worker productivity and the quality of work produced, and that both must be strengthened in order to improve the economic status of workers and their firms' competitive positions in the global marketplace. Moreover, with external pressures generated by the expansion of international trade and technological change showing no sign of abating, education and training are expected to play an even more critical role in raising productivity and improving living standards in the future.

Vocational training and its impact on earnings have increasingly attracted the attention of policy makers in recent years, with governments citing public and private training as a key element in developing the type of skilled work force necessary for economic growth in the 21st century. Despite this heightened concern with training, however, surprisingly little empirical work has been done to measure the actual impact of training programs on worker earnings. This leads us to raise such questions as: How does training affect worker earnings? Are there certain forms of training that are more successful in boosting productivity and income than others? And do the effects of training received on one job carry over to performance and compensation in other jobs? To our understanding, full and explicit answers to questions such as these have not yet been provided.

Previous studies on the effects of training generally fall into two broad categories. The first type investigates the effects of public vocational training programs on the employment and income of disadvantaged groups. As one example, Dolton (1993), studying the experience of the British Youth Training Scheme (YTS) in the United Kingdom, concluded that this program had a negligible effect on wages and a possibly negative impact on employment. Meanwhile, Green, Hoskins, and Montgomery found that not only did YTS fail to raise the wages of trainees but that it actually lowered them relative to those who had not received such training. Their conclusion: It is better to stay in school than to participate in YTS.

On the other hand, Mains (1991) shows that participation in YTS results in a quantitatively and statistically significant improvement in the probability of being employed. Similarly, Whitfield and Bourlakes (1991) conclude that YTS has helped school-leavers to obtain full-time employment and to improve their positions in the labor market. However, the results of their wage analysis suggest that YTS participants earned slightly less, *ceteris paribus*, than non-participants.

In the United States, Friedlander, Greenberg, and Robins (1997) found that government programs for the disadvantaged have had modest effects on employment and earnings for adult men and women. Jantzen (1987), using survey data to analyze the short-term impact of classroom training under the Comprehensive Employment and Training Act (CETA) in Boston, shows that Boston's programs have produced large increases in earnings for both male and female trainees. However, this finding is not consistent with those of other studies. For example, Dickinson, Johnson, and West (1986), using data from the 1976 Continuous Longitudinal Manpower Survey, found that CETA participation exerted a significant negative impact on the post-program earnings of males, and an insignificant positive impact on the post-program earnings of females.

The previous studies suggest that, on the whole, the outcomes of public training schemes have often fallen short of expectations. The fact that most of the trainees participating in such programs tend to come from disadvantaged social groups leads us to question whether such studies suffered from a self-selection bias. In other words, if participants had come from more randomly distributed backgrounds, would the outcomes have been different? Or, since bureaucracy and inflexibility seem to be commonly criticized features of public institutions, have deficiencies been built into the programs themselves? And if this is the case, would privately managed programs produce more

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successful results for trainees?

The second major category of research has focused on the effects of on-the-job-training (OJT) on trainee earnings. As one example, Bartel (1995), using a unique set of data collected from the personnel records of a large company, found that OJT had had a positive and significant impact on both wage growth and job performance scores, thereby confirming the robustness of the relationship between training and productivity. Groot and Mekkelholt (1995) concluded that workers who receive OJT have lower initial wages than those who do not, but that their wages grow more rapidly in the future. In addition, the marginal rate of return on OJT is high and increases with level of education. Vijerberg (1993), investigating returns to human capital in Cote d'Ivoire, found that technical training had generated handsome returns in the form of higher wages.

The only exception to the findings presented above is a study conducted by Hotchkiss (1993), who evaluated the relationship between training and occupation on the one hand and wages on the other, using data from a cohort of highschool graduates. Hotchkiss found a strong and positive relationship to exist between training and wages. However, when type of occupation was included in the analysis, the wage effects were almost entirely diluted, implying that occupational category, and not training, explained the increase in wages.

In spite of Hotchkiss's contrary finding it is reasonable to expect that training, provided as a premium to raise productivity and reduce turnover, will have some effect on a worker's wage. However, the benefit may be limited to only the current job and may not carry over into future employment with other firms. Only a few studies address the question of whether the effects of training are portable across jobs. One by Booth (1993) finds that female workers who receive training for one job substantially increase their wages in subsequent jobs within the same firm. For males, training received during the last job was seen to have little effect on wages from the current job, although training in earlier job assignments had a more significant impact.

A study conducted by Lynch (1992) shows that OJT received before the current job has no impact on current earnings, but that off-the-job training before current employment has a significant and positive impact. The reason for this may be that OJT is too firm-specific to benefit subsequent employers, who therefore are unwilling to pay workers extra for such training. On the other hand, off-the-job training may be sufficiently generic to make wage effects portable. If that is the case, pre-job training may be expected to have a significant effect on trainee wages.

Instead of examining the earnings effect of training provided by previous employers, this study seeks to determine whether pre-job training (obtained from either public or private training organizations) enhances the growth of trainee earnings. In order to avoid the problem of self-selection (i.e., to exclude members of socially disadvantaged groups), a group of engineers randomly selected from high-tech firms were chosen as the research subjects. Section II of the paper describes the model to be estimated and provides further information about the data source. A discussion of the findings is presented in section III. Some conclusions are drawn in the final section.

Methodology

The following functional relationship was applied to evaluate the effects of pre-job training on trainee earnings:

$$Y = f(AGE, EDU, GENDER, SENIORITY, PRITRA, GOVTRA, IC, COM, LSIZE),$$

where Y, the dependent variable, represents the monthly salary of trainees.

Most studies (Booth, 1991 and 1993; Groot and Mekkelholt, 1995; Lynch, 1992) use logarithmic values in place of actual earnings. This study employs the original values to estimate the real earnings effect. However, the results of both forms of estimation were double-checked in order to ensure consistency.

Two broad classes of variables affect earnings. The first type, associated with human capital accumulation, is represented by the number of years of formal education completed (EDU), job tenure in years (TENURE), AGE, and GENDER. The second type comprises the log of the firm size (LSIZE) and industrial classification (IC, COM). These are included to represent characteristics of the workplace and to serve as controlling variables.

To test the effects of pre-job training programs, dummy variables were constructed indicating whether the respondent had received any form of training before being hired by the current employer. More specifically, a dummy variable of 1 was assigned if the respondent had participated in a training program provided by a government (GOVTRA) or private organization, and a dummy variable of 0 in the opposite case.

Data for the study were obtained from the *Survey on the Source of High-Tech Employees' Skills* (Lee, Huang, and Jehng, 1998). The respondents were production and R&D engineers employed by integrated circuit (IC), communications, and electronics firms at the Science-based Industrial Park in Hsinchu, Taiwan. Of the 1,448

questionnaires mailed out, 344 were returned. The data were organized into a stratified sample on the basis of industry and firm size. After adjustment for missing values, the data set was found to contain a total of 309 observations.

Table 1 presents the means and standard deviations of the variables. The average age of the respondents was 30 years and average seniority 2.56 years. The major reason for these relatively low values is that the three industries surveyed are newly established in Taiwan. Length of formal schooling averaged 16.44 years. Twenty-five percent of the respondents had graduated from college, with 29 percent holding a bachelor's degree, 43 percent a master's, and 3 percent a Ph.D. Only 14 percent of the engineering staff were female. Respondents earned an average monthly salary of NT$42,942 (US$1,245 at the current exchange rate), slightly higher than the average wage of workers in Taiwan. Nineteen percent of the respondents reported that they had participated in private training programs, while only 8 percent had taken part in public training programs.

Table 1
Means and Standard Deviation for Variables in the Model

Variables	Mean	Standard Deviation
AGE	30.10	4.26
EDU (Formal schooling years)	16.44	1.80
GENDER (Male = 0, Female = 1)	0.141	0.348
PRITRA (No = 0, Yes = 1)	0.193	0.395
GOVTRA (No = 0, Yes = 1)	0.085	0.279
SENIOR (Seniority in the current company)	2.56	2.79
WAGE	NT$ 42,942 (US$ 1,245)	NT$ 14,836 (US$ 430)
FIRM SIZE (Number of employees)	731	865

Results and Discussion

Partial correlation coefficients between the wage level and independent variables, obtained by controlling for industry and firm size, are presented in Table 2. As can be seen, there is a positive relationship between age on the one hand and both public and private training on the other, implying that the greater a worker's age the more likely that he or she has received pre-job training. Though gender and pre-job training are negatively related, the relationship is not significant. Educational attainment and pre-job training are also negatively associated. The implication here is that females and highly educated engineers are somewhat less likely to have received pre-job training than other workers are, though their training experience does not differ significantly from that of less-well-educated males. All of the independent variables except gender are significantly related to the wage level. This shows that females are paid lower salaries than males even though the effects of firm size, industry, and occupation have been controlled.

Table 2
Partial Correlation Coefficient for Key Variables by Controlling for Industry and Firm Size

Variables	AGE WAGE	EDU	GENDER	PRITRA	GOVTRA	SENIORITY
AGE	-					
EDU	.133*	-				
GENDER	-.240**	-.113	-			
PRITRA	.208**	-.104	-.004	-		
GOVTRA	.283**	-.088	-.047	.399**	-	
SENIORITY	.602**	-.333**	-.027	.157*	.184*	-
WAGE	.770**	.303**	-.218**	.263**	.220**	.448** -

*: p<.05 **: p<.01

The regression results for the wage equation, in which the respondent's monthly wage is the dependent variable, are presented in Table 3. Like other researchers (Booth, 1991 and 1993; Groot and Mekkelholt, 1995; Lynch, 1992), I estimated the equations with both logarithms and the actual values of individual wages without obtaining any difference in results. However, since actual wages are easier to understand, I have presented them instead of logarithms in Table 3.

The F-value for the whole model, 52.84, is significant at the $p < .000$ level. This value shows that the model provides a meaningful prediction of individual earnings. Both R^2 and adjusted R^2 are remarkably high, with the model explaining 67 percent of the variation in individual earnings.

Of the organizational features that I included as controlling variables, such as firm size and categories of industry, none had a coefficient showing significant difference from zero. This may be due to the fact that the three industries surveyed (IC, communications, and electronics) all compete for labor in the same market. Therefore, assuming uniform labor quality, those industries may offer compensation packages that are quite similar. At the same time, given that the profitability of high-tech firms is derived from their business strategy and innovative ability and not from their size, it is understandable how the logarithm of firm size could have an insignificant impact on employee wages.

Since the organizational variables did not improve understanding of the determinants of individual earnings, I deleted them and adopted the parsimony model. As shown in Table 3, removing the organizational variables resulted in a negative, though insignificant, relationship between gender and wage. This negative association may be due to the fact that female engineers tend to be younger and less well-educated, and to accumulate less seniority than their male counterparts. After the effects of age, education, and seniority were controlled, the negative impact of gender on wages became negligible.

I am not about to claim that sex discrimination does not exist in Taiwan. In fact, another study (Huang, 1994) found that the earnings of female workers in Taiwan are indeed markedly lower than those of males, even when human capital variables are introduced. The difference between that study and this one may lie in the different natures of the research subjects. Participants in this study, engineers in high-tech firms, were more likely to be compensated on the basis of their knowledge, technical skill, and problem-solving ability than participants in the earlier study, for whom physical strength and manual dexterity were also important concerns. The negligible impact that gender was found to have on wages in this study is an exciting finding because it implies that if we wish to reduce gender-based wage discrimination, increasing female employment in professional and technical occupations may be a good way to do it.

As human capital theory would lead us to expect, educational attainment and seniority were both found to have very strong positive effects on individual earnings in this study. The effect of education on earnings (Beta = .334) was somewhat greater than that of seniority (Beta = .272), with every additional year of education generating NTS

2,711 (US$ 79) more in monthly wages, vs. NT$ 1,400 (US $41) more for each additional year of seniority. This differs from Huang's 1994 study, in which length of service with the current employer was found to have a stronger impact on worker earnings than education. Once again, the difference may be explained by the different categories of workers participating in the two studies. The earlier research focused on workers in general while this study deals with the employees of high-tech firms, where educational attainment is of crucial importance in determining the level of compensation.

As predicted, age was seen to have a strongly positive effect on earnings in this study. With its Beta estimated at .503, the age variable was the most powerful predictor of the individual wage level, and workers were found to earn NT$ 1,696 (US$ 49) more per month on average than other workers only one year younger. Also interesting is that when the square of the age variable was included in the equation, no significant effect was detected. The implication is that there is a linear relationship between wage and age (there was no indication of a curvilinear relationship).

As can be seen in Table 2, both public and private training programs are significantly correlated with wages when the effects of industry and firm size are excluded. However, public training programs (GOVTRA) had a negligible impact on wage in the regression model, regardless of whether the organizational variables were included or not. The reason for this may be that the variable GOVTRA is strongly correlated with AGE and SENIORITY, and when the effects of the last two variables are removed the pseudo relationship between GOVTRA and WAGE disappears. We may therefore conclude that the training programs offered by public institutions in Taiwan do not improve the economic status of trainees later in their careers. Even though the research subjects in this study did not belong to a disadvantaged group, the result is similar to those obtained by Dolton (1993); Green, Hoskins, and Montgomery (1996); and Whitfield and Bourlakes (1991) in England, and that of Dickinson, Johnson, and West (1986) in the United States.

While training provided by government showed little impact on wages, the effect of private training programs (PRITRA) on post-job earnings was significant and positive. The Beta of PRITRA (.128) was considerably greater than that of gender (-.061). And when the effects of years of formal schooling, age, seniority, and gender were controlled, those who had received private training could expect to earn NT$ 4,978 (US$ 144) more each month than those who had not. One implication of this finding is that females can overcome the disadvantage of gender-based wage discrimination by participating in private training programs. And although Booth (1993) concluded that females were less likely to receive such training than otherwise identical males, this study found that male and female workers in Taiwan had equal access to private training programs.

There is a significantly positive relationship between PRITRA and GOVTRA, indicating that private and public training programs have complementary and not mutually exclusive effects. Another implication is that people who participate in pre-job private training programs are also more likely to take part in public training programs. However, the economic returns of private training programs are markedly greater than those of public training programs. One reason for this may be that private programs, whose existence must be justified by their effects on the bottom line, are more oriented toward immediate payback than public programs. For public institutions, which face no direct threat to their survival from rivals, trainee earnings are only one of the factors considered. Indeed, political considerations (such as providing opportunities for minorities, the disadvantaged, and the unemployed) may well take precedence over concerns about wages. In addition, administrative red tape and bureaucratic inflexibility, conditions for which public institutions are commonly noted, also may limit the effectiveness of public training programs.

Previous studies (Booth, 1993; Lynch, 1992) concluded that job training obtained from former employers can be expected to increase trainee earnings in subsequent employment. This study finds that pre-job training provided by private training institutions will help improve the future earnings of participants. One explanation for this is that training provided by private institutions is likely to be generic in nature, and skill and knowledge acquired from such training are easily transferable across jobs. The result is that future employers are willing to pay higher compensation to employees who have received this type of training.

Table 3
The Regression Results of Wage Determination

Independent Variables	Full Model			Parsimony Model		
	b-coeff	Beta	t-stat	b-coeff	Beta	t-stat
Constant	-56,412		-8.41**	-56,364		-9.39**
Individual Characteristics						
EDU	2,675	.320	6.97**	2,711	.334	7.94**
AGE	1,810	.540	9.46**	1,696	.503	9.52**
SENIORITY	1,237	.243	4.26**	1,400	.272	5.29**
GENDER (M=0 F=1)	-1,918	-.045	-1.13	-2,527	-.061	-1.60
Training Variables						
GOVTRA	-59	-.001	-.03	486	.009	.22
PRITRA	5,734	.144	3.52**	4,978	.128	3.23**
Organizational Variables						
LSIZE	-504	-.047	-1.12			
IC	266	.009	.15			
COM	1,544	.049	.83			
R^2	.685			.664		
Adjusted R^2	.672			.656		
Degrees of freedom	Regression = 9			Regression = 6		
	Residual = 219			Residual = 250		
F-value	52.841			82.345		
Level of significance	.000			.000		

*: p<.05 **: p<.01

Conclusion

The principal aim of this paper has been to measure the impact of pre-job training programs on trainee wages later in their careers, with a special focus on engineers employed by high-tech firms in Taiwan. When the effects of educational attainment, age, and seniority were controlled for, this study found that public training programs have no impact on the later job earnings of participants. However, since only a few of the respondents participating in the study had taken part in public training programs before their current employment, this conclusion must be only a tentative one. More extensive data collection and further research are necessary for a fuller understanding of the relationship between public training programs and wages.

By contrast, this study finds that participation in private training programs does have a significantly positive effect on post-job earnings. Specifically, those who had participated in pre-job private training programs were seen to earn NT$4,978 (US$144) more per month on average than those who had not, a result consistent with that of Booth's study in England. The only difference is that Booth focused on the effects of training provided by former employers. The implication is that the earnings effect of previous training can be carried over from one job to another, regardless of whether that training has been provided by a former employer or by a private training institution.

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Training Effectiveness And Employee Output - A Regression Model Based On Training Transfer And Organization Development Variables

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Despite the considerable amount of money organizations spend on their training investments, it has yet to be determined to what extent such investments benefit the organization. This study attempted to address this issue by describing the relationship between training effectiveness and employee output through regression analysis. Stakeholder involvement, person analysis, and the training transfer climate were found to be the most important predictors of employee output.

Keywords: Training, Transfer, Productivity

Many Human Resource Development (HRD) textbooks and theorists define HRD as a profession for which the main purpose is to assist the organization achieve higher levels of performance. In particular, Broad and Newstrom (1992) define HRD as "the profession that helps organizations to enhance workforce effectiveness and productivity through learning and other performance improvement activities" (p. 4). Similarly, Pace, Smith, and Mills (1991), define HRD as "the integration of individual development, career development, and organization development roles to achieve maximum productivity, quality, opportunity, and fulfillment for organization members as they work to accomplish the goals of the organization" (p. 7).

According to Broad and Newstrom (1992), HRD professionals facilitate performance improvement in the organization in several ways. First, they may help determine the requirements for performance improvement. These requirements, the authors continue, might be for new skills arising from new technologies, products, services, or a changing work environment, or for improvement of skills used in current jobs. Once the requirements for performance improvement are identified and analyzed, then the HRD professionals propose changes in the work environment to support improved performance.

In terms of training, which is "the most commonly recognized HRD strategy to improve performance" (Broad & Newstrom, 1992; p. 5), different estimates project that the annual investment on training by US organizations is somewhere between $50 and $100 billion(Baldwin & Ford, 1988; Industry report, 1994). According to the "ASTD Benchmarking Forum" (1997), these training expenditures account for about 2.88% of the total payroll.

Despite the considerable amount of money organizations spend on their training investments, it has yet to be determined to what extent such investments benefit the organization. Researchers have indicated that only a fraction (10-20%) of the skills and knowledge learned during training are really transferred back to the job (Baldwin & Ford, 1988; Broad & Newstrom, 1992). Further, very little research has been conducted to examine the impact of training on such bottom-line organizational performance as productivity and quality. In addition, very limited research has been conducted to identify which organizational variables may have an effect on the training intervention.

Purpose of the Study

Given the existing lack of knowledge with regard to the relationship of training effectiveness and organizational performance, the purpose of this study was to describe the association of training effectiveness and productivity as well as work quality improvement after new technologies are introduced in the organization. In this study productivity and work quality were measured at the individual level, and each was based on a set of three and five indicators respectively. In this paper, only the relationship between training effectiveness and the productivity indicator of "employee output per unit time" will be discussed. Since no other studies of this kind had been previously conducted, a secondary objective of this study was to develop an instrument with which all the relevant training transfer and organizational variables and constructs could be assessed.

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Theoretical Framework

The theoretical framework of the study was based on the instructional system design (ISD), sociotechnical systems (STS), and training transfer theories, which in turn furnished the training and organizational variables projected to have an influence on trainee performance.

Training Transfer

For the purposes of this study, training transfer is defined as "the degree to which trainees effectively apply the knowledge, skills, and attitudes gained in a training context to the job" (Baldwin & Ford, 1988, p. 63). Although in many respects research on training transfer is still limited (Clark, Dobbins, & Ladd 1993; Hanover & Cellar, 1998; Holton, 1996; Rouiller & Goldstein, 1993; Tracey, Tannenbaum, & Kavanagh, 1995) researchers have identified a number of factors or characteristics that can facilitate or inhibit the application of newly learned skills, knowledge, and attitudes on the job. In particular, a research review by Baldwin and Ford (1988) suggested that training transfer is contingent upon many variables some of which fall outside the training program. Training design, trainee characteristics, and work-environment characteristics were cited as the most important sets of variables. Based on the findings of their research review Baldwin and Ford (1988) also suggested that the expectancy model could assist us in identifying the factors that can influence the motivation with which a trainee will apply the new skills and knowledge back on the job. Baldwin and Ford (1988) further stated that training research cannot continue to ignore that job relevance of training content is a critical factor which affects what is learned, retained, and transferred back to the job.

Some of the training research deficiencies identified by Baldwin and Ford (1988) were investigated further by Clark et al. (1993). Clark et al. (1993) conducted a structural equations modeling study in which 245 participants from 12 training groups responded to a survey questionnaire. The purpose of the study was to explore the effects of several contextual factors on training motivation. The survey instrument was designed to measure training motivation, expected job and career utility of training, peer and supervisor training transfer climate, involvement in decision to be trained, and decision-maker credibility. In this study, career utility was defined as "the perceived usefulness of training for attainment of career goals, such as getting a raise or promotion, or taking a more fulfilling job" (p. 294). Job utility was defined as "the perceived usefulness of the training course to facilitate goals associated with the current job, such as increased productivity, reduced errors, or better problem-solving skills" (p. 294).

In short, the Clark et al. (1993) study revealed the following important findings: (a) perceived job and career utility of training significantly predicts training motivation, (b) involvement in the decision to be trained results in higher perceptions of job and career utility, (c) the credibility of the individual recommending or requesting training affects job and career utility, and (d) perceived supervisory support for training transfer affects anticipated job utility and thus motivation to learn during training.

Another study that examined the relationship between organizational transfer climate and positive transfer of training was conducted by Rouiller and Goldstein (1993). In this study, organizational transfer climate was defined as the "situations and consequences that either inhibit or help to facilitate the transfer of what has been learned in training into the job situation" (Rouiller & Goldstein, 1993; p. 379). In all, 41 situation cues and 22 consequences that were thought to influence training transfer were selected from a previously developed databank consisting of 298 critical incidents. Situation cues were defined as those cues which reminded the trainees of their training or provided them with opportunity to use their training upon returning to their job and they were divided into four categories: goal cues - the type of cues that remind the trainees to use the newly learned skills; social cues - the behaviors and influence processes exhibited by peers, supervisors, and/or subordinates; task cues - the cues that concern the design and nature of the job itself; and, self-control cues - self-control processes that allow the trainee to use what has been learned. Consequences were defined as those actions in the work environment which could affect the further use of what the trainees learned in training. As in the case of situation cues, consequences fell into four categories: positive feedback - trainees are given positive information about their use of learned behaviors; negative feedback - trainees are informed of the negative consequences for not using learned behaviors in training; punishment - trainees are punished for using trained behaviors; and, no feedback - the trainees are not given information with regard to the use or importance of learned behaviors.

After analyzing the data, Rouiller and Goldstein (1993) observed that in organizational units where the transfer climate was more positive (i.e., climates in which situation cues influenced trainees to use what was learned in training and in which trainees were rewarded for doing so), trainees demonstrated more transfer behavior. Furthermore, the analysis of data indicated that trainees who learned more in training performed better on the job, but the interaction between transfer climate and learning was not significant. In concluding their study, the authors

stressed that the field is in need of further research that investigates the relationship between organizational climate, training transfer, and job performance. If such a relationship proves to be robust, the authors continue, then organizational analysis assessing transfer climate should be a requirement in determining whether the organization is indeed ready to support its training program.

Based partly on the work of Rouiller and Goldstein (1993), Tracey et al. (1995) conducted a study examining the influence of the work environment on the transfer of newly learned supervisory skills. The work environment in this study was operationalized in terms of training transfer climate as well as continuous-learning culture which in turn through a principal component analysis were defined in terms of six (social and goal cues; task cues; no-feedback consequences; punishment consequences; extrinsic reinforcement consequences; intrinsic reinforcement consequences) and three (social support; continuous innovation; competitiveness) scales respectively. In all, through a LISREL analysis Tracey et al. (1995) confirmed that the constructs of training transfer climate and continuous-learning culture have a direct effect on post-training behaviors. Furthermore, each of the six training transfer climate scales as well as all continuous-learning culture scales were found to significantly contribute to their respective constructs. However, the authors pointed out that the scale that exhibited the highest path coefficient for both constructs was the one most closely related to the social support system (0.90 for training transfer climate and 0.91 for continuous-learning culture). As Tracey et al. (1995) put it "these findings are consistent with sociotechnical theory and highlight the central role of social factors in establishing supportive training and learning environments" (p. 249). Finally, the authors recommended that future studies should continue to examine the role of the work environment given its influence on training transfer.

In summary, with their study, Tracey et al. (1995) have extended and verified the results of Rouiller's and Goldstein's (1993) findings by indicating that the work environment indeed plays a crucial role in determining training effectiveness. This study also exemplified the importance and the influence of the social system (supervisors, coworkers, and other people who interact with trainees) and thus how sociotechnical systems theory can assist us in designing more effective training programs and organizations in general.

Sociotechnical Systems Theory

Since the early experiments conducted by Trist and Bamford (1951) in the coal mines of England, sociotechnical systems theory (STS), as an OD intervention, has experienced tremendous popularity. As the terms imply, the two basic premises of STS theory are: a) an organization is comprised of two systems: the social system and the technical system; and (b) the organization is an open system greatly dependent on the external environment. The social system is comprised of people performing the organizational tasks. The technical system is comprised of tools, techniques, and methods that people use to perform their tasks. What distinguishes an STS designed organization from traditional organizations is that it places equal emphasis on both the technical and social systems, rather than just the technical system, and tries to achieve high levels of performance through the joint optimization of these two systems. At the same time, the social and technical systems of an STS organization are required to effectively manage their boundaries with the external environment so that any disruptions caused by the latter are kept to a minimum (Cummings & Huse, 1985; French & Bell, 1995; Pasmore, 1988).

Under the STS theory, the organization is also viewed as an open system composed of many subsystems which through differentiation and integration transform inputs into outputs. Another feature of STS organizations is that they are highly participative in nature and thus involve all relevant stakeholders in the decision making process. Furthermore, sociotechnical organizations invest heavily in the development of their human resources. Their goal is to develop multifunctional and well trained employees who in turn through continuous learning become highly flexible and adaptable to changing conditions. Being trained in multiple skills and expertise and having all necessary information and autonomy, STS employees also have the opportunity to perform whole and meaningful tasks with minimal supervision and specification, control variances at their source, and at the same time release management to deal with boundary problems. Lastly, by placing equal importance on the well-being of employees as well as organizational productivity, STS organizations through innovative reward systems and enriched jobs, manage to create high performance environments in which workers pursue organizational goals with higher levels of energy and commitment (Cummings & Huse, 1985; French & Bell, 1995; Pasmore, 1988).

Research Questions

As it was stated earlier, the main purpose of this paper is to describe the relationship between training effectiveness and the productivity indicator of "employee output per unit time". Furthermore, a secondary objective of this study

was to develop a questionnaire with which all relevant constructs and variables could be assessed. In short, the following training transfer variables that were found by the Rouiller and Goldstein (1993) as well as the Tracey et al. (1995) studies to have a direct effect on post-training behaviors were incorporated in the survey instrument of the study:

1. The degree to which characteristics of a trainee's job prompted or reminded him or her to use new skills and knowledge acquired in training (task cues).
2. The degree to which trainees were openly discouraged from using new skills and knowledge acquired in training (punishment consequences).
3. The degree to which supervisors supported and encouraged the application of new skills and knowledge acquired in training (supervisory support for new skills).
4. The degree to which trainees received extrinsic rewards for using newly learned skills and knowledge acquired in training (extrinsic reinforcement consequences).
5. The degree to which trainees received intrinsic rewards, such as praise and recognition, for using newly learned skills and knowledge acquired in training (intrinsic reinforcement consequences).
6. The degree to which the users of the new technology functioned in a work environment which emphasized innovation and competition (innovative-competitive organization).
7. The degree to which the users of the new technology functioned in an environment in which supervisors and coworkers strongly encouraged the acquisition and use of any new relevant skills and behaviors (social support for new skills).

The following 10 variables were also incorporated in the survey instrument and they dealt with the work environment within which the training and new technology interventions were introduced. They were based on Pasmore's (1988) STS assessment survey, the properties of motivating jobs as defined by Hackman and Oldham (1980), and the comprehensive seven year meta-analysis study by Macy and Izumi (1993) in which the d-effects of 60 sociotechnical action-levers on organizational outcomes were examined. The purpose of these questions was to determine the degree to which the new technology was introduced in an organization whose design was consistent with sociotechnical systems principles, which in turn "have been demonstrated to produce high levels of commitment and performance" (Pasmore, 1988, p. 157).

8. The degree to which the users of the new technology functioned in a very participative organization characterized by a high degree of employee involvement (Participative organization).
9. The degree to which the users of the new technology were members of self-directed teams (self-directed teams).
10. The degree to which the users of the new technology were intimately involved in communications and decisions regarding the design and development of the new technology (employee involvement). 11. The degree to which the users of the new technology functioned in a multiskill work environment characterized by a common job classification system (multiskill work environment).
12. The degree to which the users of the new technology worked in a flat and decentralized organization, composed of mini-enterprises functioning within the firm (flat organization).
13. The degree to which the users of the new technology frequently participated in multiskill training and retraining programs and were rewarded for doing so (multiskill training environment).
14. The degree to which the users of the new technology were involved in enriched jobs that required a variety and higher level skills which in turn took a long time to master (skill variety).
15. The degree to which the users of the new technology did a whole and complete piece of work and had the authority to make all important decisions about it throughout the process (task identity).
16. The degree to which in carrying out their work activities required by the job, the users of the new technology received clear information about the effectiveness of their performance from the job itself and their supervisors (job/supervisory feedback).
17. The degree to which the users of the new technology functioned in an environment in which a great deal of information about business was shared with employees (information sharing).

This paper will address the following research questions:

1. If training is used during the introduction of new technologies in the organization, to what extent are the following instructional system components associated with the productivity indicator of "employee output per unit time"?
    a) Needs assessment (person analysis, task analysis, organizational analysis);
    b) goals and objectives;
    c) audience analysis;
    d) d) learning task analysis and/or procedural analysis;
    e) evaluation results (pretest score, posttest score, training retention score).

2. If training is used as a coping strategy during the introduction of the new technology in the organization, what is the degree of association between the productivity indicator of employee output and training performance as well as the identified training transfer and work environment variables?

Methodology

Subjects

The sampling frame of this study consisted of 4097 training, human resource, quality, and organization development professionals who were national members of the American Society of Training and Development (ASTD) and were listed under the Total Quality Management section of the 1995 directory. Out of these 4097 national members, 971 were randomly selected to participate in the study through the circular systematic sampling procedure. Of the returned surveys, 264 had usable data. The response rate for this study was calculated at 27.19%. The average age of the respondents was 43.35 years (SD = 8.32). Fifty-eight percent of the respondents were male and each participant had held his or her present job for an average of 4.65 years (SD = 3.70). Collectively, 96.4% of the respondents had a college degree and represented 46 states. Furthermore, the respondents worked in all sectors of the industry with manufacturing (33.19%), health care (10.54%), and financial services (10.14%) being the majority. Finally, the participants of this study worked in organizations that on the average employed 7,595 employees (SD = 19,244).

In terms of the new technology introduced in the organization, representing 77.2% of valid responses, information technology was the type of technology most respondents introduced in their organization during the last five years. On the other hand, computer-aided manufacturing technologies, materials technologies, and biotechnologies were introduced by only 9.5%, 1.1% and 0.4% of the respondents respectively. The remaining 11.8% of the respondents indicated that they introduced a variety of other technologies, such as new equipment or machinery, production systems, and process operations.

Instrument

The instrument for this study consisted of a mail questionnaire which was custom-designed for the purposes of this study. The questionnaire was comprised of 39 questions and was pilot-tested on a group of 50 participants before the main study.

Results

After the data from the 264 participants was collected, both descriptive and inferential statistics were used to analyze it. The instrument was construct validated through a principal components analysis that utilized a varimax rotation (Table 1). Coefficient alpha was measured at 0.87. Correlational analyses as well as a stepwise regression model (Tables 2, 3, 4) were used to determine how the instructional system components in conjunction with the identified training transfer and organizational moderator variables and factors related to the productivity indicator of employee output.

Construct Validation of Instrument

As shown in Table 1, the principal components analysis that used a varimax rotation produced a four factor solution which accounted for 55.1% of the total variance. The sample size utilized for the principal components analysis was 242 for which the critical value for significant loadings was calculated at |0.33|. The criterion used in order to determine how many components to retain was that of Kaiser (i.e., only components whose eigenvalues are greater than 1 were retained).

Briefly, the first factor which accounted for 33.7% of the total variance had the highest loadings from the following eight variables: innovative-competitive organization; social support for new skills; participative organization; self-directed teams; employee involvement; flat organization; multiskill training environment; and, information sharing.

From the above variable descriptions, it becomes evident that the first rotated factor deals with the general organizational

environment within which the new technology was introduced.Given that the variables that highly correlate with this

Table 1. Varimax Rotated Factor Matrix

Variable Description	STS Org	Job Design	Training Transfer Climate	Rewards For New Skills
1 Task cues	- .07	.33	.74	- .18
2 Punishment consequences	.17	- .10	.53	.12
3 Suprv support new skills	.20	.06	.64	.27
4 Extrinsic reinforcement	.07	.20	.00	.83
5 Intrinsic reinforcement	.27	.06	.35	.61
6 Innovative-comp org	.51	.03	.13	.34
7 Social support new skills	.66	.16	.33	.17
8 Particicpative org	.82	.21	.13	.07
9 Self-directed teams	.56	.34	- .08	.18
10 Employee involvement	.50	.28	.10	.29
11 Multiskill work env	.06	.70	.16	.06
12 Flat org	.52	.48	- .10	- .05
13 Multiskill training env	.62	.18	.20	.31
14 Skill variety	.22	.68	- .01	.18
15 Task identity	.31	.69	.06	.08
16 Job/suprv feedback	.35	.44	.35	.28
17 Information sharing	.79	.14	.15	- .05

N = 242

factor are those that were incorporated in the questionnaire in order to determine the degree to which the new technology was introduced in an organization whose design was consisted with sociotechnical systems (STS) principles, this factor was interpreted as the "STS organization" factor.

The second rotated factor, which accounted for 8.2% of the total variance, highly correlated with the following variables: multiskill work environment; skill variety; task identity; and, job/supervisory feedback. In all, the second rotated factor was successful in grouping the variables that were incorporated in the instrument in order to describe the job dimensions of the work performed by the users of the new technology. This factor was defined as the "job design" factor.

The third factor of the varimax rotated factor matrix accounted for 7.1% of the total variance and drew the highest loadings from the following three variables: task cues; punishment consequences; and, supervisory support for new skills. Unlike the first two factors which dealt with the organizational and job environment in general, the third factor dealt with the training transfer climate in which the application of new skills and knowledge took place. This factor was therefore interpreted as the "training transfer climate" factor.

The fourth and final rotated factor accounted for 6.1% of the total variance and had the highest loadings from the following two variables: extrinsic reinforcement consequences; and intrinsic reinforcement consequences. The last factor can thus be interpreted as the "rewards for new skills" factor.

Correlational and Regression Analysis

The variables and the factor that were found to be significantly correlated with the "employee output per unit of time" productivity indicator are shown in Table 2. Although not significant because of the small sample size (n=27) associated with the training retention variable, the correlation between employee output and training retention is also included in the table in order to highlight the relatively high correlation between these two variables. The correlation between employee output and the posttest score was included in the table for comparison purposes.

As shown in Table 2, the productivity indicator of employee output per unit time was found to be significantly correlated with five variables (task cues; intrinsic reinforcement; multiskill work environment; person analysis; stakeholder involvement in the decision with regard to the need of the new technology) and the training transfer climate factor. Moreover, employee output was found to exhibit the highest correlation with the training retention variable. The correlation between employee output and the posttest score was found to be relatively small and non-significant.

The results of the multiple regression analysis for the employee output indicator are depicted in Tables 3 and 4. The independent variables included in the regression analysis were the four factors as well as the variables of stakeholder involvement (the extent to which relevant stakeholders were involved in the decision with regard to the need for the new technology), and person analysis (the extent to which the training program involved the conduction of a person analysis in order to determine who in the organization needed training in order to use the new technology). As stated earlier, the retention of training material variable was not incorporated in the regression analysis due to the small sample size associated with it. An attempt to include it even on a pairwise case basis resulted in a failure to produce a regression model.

Table 2. Significant Correlations of the "Employee Output Per Unit Time" Productivity Indicator

Posttest	Task Cues	Intrinsic Reinf	Multiskill Work Env	Training Transfer Climate Factor	New Techn Person Analysis	Stakeholder Involvement	Training Retention Score
Employee Output	.169 *	.180 *	.182 *	.236**	.276**	.282**	.329	.134
(N)	(152)	(154)	(162)	(147)	(155)	(155)	(27)	(75)

**. Correlation is significant at the 0.001 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3. Stepwise Regression Model for Employee Output Per Unit Time[a,b]

Model	Variables Entered	Variables Removed	R	R^2	Adjusted R^2	Std. Error Of the Estimate
1	New Technology Stakeholder Inv.		.277	.077	.070	22.07
2	Person Analysis	.	.372	.139	.126	21.40
3	Training transfer climate factor	.	.410	.168	.150	21.10

[a]. Dependent Variable: Employee Output Per Unit Time; N = 144

[b]. Method: Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

Table 4. Beta Coefficients for Employee Output Per Unit Time Regression Model

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
(Constant)	3.919	5.772		1.658	.100		
New Technology Stakeholder Inv.	14.334	4.985	.225	2.875	.005	.960	1.041
Person Analysis	10.577	3.551	.231	2.979	.003	.982	1.018
Training transfer climate factor	3.919	1.757	.176	2.231	.027	.952	1.050

As it is shown in Tables 3 and 4, the produced stepwise regression model accounted for 15.0% of the total variance of the employee output per unit time productivity indicator. Stakeholder involvement in the decision with regard to the need for the new technology accounted for 7.0% of the total variance (b = 0.225, p = 0.005), while person analysis for 5.6% (b = 0.231, p = 0.003). The training transfer climate factor accounted for 2.4% of the total variance (b = 0.176, p = 0.027). From Table 3 one also observes that at 10.7% the shrinkage of R square is relatively small. The very high tolerance values of 0.960, 0.982, and 0.952 in Table 4 indicate that multicollinearity was not a problem for this regression model.

Summary andConclusions

In the aggregate, what the regression model of this study suggests is that when introducing new technologies in the organization employee productivity will be more likely to increase when a) the relevant stakeholders are involved in the decision with regard to its need; b) a person analysis is conducted in order to determine who in the organization actually needs training in order to use the new technology; and c) a positive training transfer climate prevails in the organization.

Based on the data depicted in Table 2, one may also conclude that knowledge of training material immediately after training (posttest score) has a relatively weak association with the productivity indicator of employee output per unit time (r =.134). On the contrary, the retention score, or knowledge of training material three to nine months after completion of training, was found to exhibit a relatively much higher correlation with employee output (r = .329). What this finding suggests is that training retention is a better predictor for employee performance than the posttest score. It should also be noted that of all the correlations depicted in Table 2, the correlation between the retention score and employee output was found to be the highest one. This again exemplifies the importance of the training retention variable when predicting or measuring employee performance after training.

Other variables that were found to be significantly and positively correlated with employee output were: task cues - the degree to which characteristics of a trainee's job prompt or remind him or her to use new skills and knowledge acquired in training; intrinsic reinforcement - the degree to which trainees receive intrinsic rewards, such as praise and recognition, for using newly learned skills and knowledge acquired in training; and multiskill work environment - the degree to which the users of the new technology function in a multiskill work environment characterized by a common job classification system. In short, what these correlations imply is that when a new technology is introduced in the organization the corresponding training program will have a better chance of being successful when a) it is designed to reflect the actual tasks performed on the job; and b) it is implemented in a multiskill work environment which in turn is designed to recognize those who apply the newly learned skills and knowledge.

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Only Time Will Tell: Strengthening the Link Between HRD and Firm Performance

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We report on results from a second round of data on training investments, practices, and outcomes in the United States. Our cross-sectional analyses once again point to a definite link between investments in human capital and organizational measures of performance. Longitudinal analyses strengthen this finding by demonstrating that 1996 human capital investments predict 1997 organizational performance. The evidence, however, also suggests that this relationship may not be unidirectional, but one of mutual reinforcement.

Keywords: Training, Performance, Survey Data

In today's competitive environment where countless organizations have either downsized and outsourced their training and development functions, HRD practitioners in all kinds of organizations and settings are increasingly being asked to justify their existence. Indeed, recent surveys reveal that HRD professionals are feeling enormous pressures to demonstrate the results of the services they provide (Hackett, 1995). Never before have their training and development efforts been under such tremendous scrutiny.

The response by many practitioners has not been surprising. We have witnessed a growing interest in tying investments in human resources to actual business results and organizational performance (Boudreau and Ramstad, 1996; Lam & White, 1998). Numerous organizations have worked out complex formulas to determine the precise return-on-investment (ROI) they are getting on their HRD investments. Unfortunately, such one-off, company-based efforts do not lend themselves well to a primary interest of researchers and scholars in the field of HRD: making systematic comparisons across organizations of the link between HRD investments and organizational performance. Such rigorous analyses require data on a large set of organizations that can only come from survey-based research methods.

Understanding the link between HRD investments and performance is further complicated by issues of time and causality. The case that firm performance influences HRD investments can be argued as strongly as the case in the reverse decision. Certainly, a circular or feedback relationship is also clearly possible. Cross-sectional survey research, however, is limited in its ability to demonstrate the connections between HRD and performance over time, even with the best retrospective questions. Only by gathering information on investments and performance over time can the link between the two begin to be unraveled.

This paper provides an update of the results from our ongoing research into the measurement of the impact and value of human capital investments. Over the last few years, we have been engaged in efforts to develop methods for collecting data on investments in workplace training and development, measuring that investment, and relating these measures to performance outcomes. We report on the findings from the second round of data collected through an ongoing national survey of training and development practices. In particular, we focus on findings from analyses of 85 firms that reported in both rounds of our survey to examine linkages between their human capital investments and firm performance.

Research Questions

To help organizations make wise decisions about their investments in employee training and development, the primary question addressed by our study is the extent to which a relationship exists between firms' expenditures on the education and training of their workforce and measures of performance. We investigate not only the *level* of investments and performance, but also *changes* in both sets of measures using data from two points in time. The results from our first round of data hinted at a strong correlation between these investments and the performance of the organizations (Bassi and Van Buren, 1998a). Furthermore, for a subset of 40 publicly-traded firms, we were able

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to use publicly-reported data to demonstrate an association between the level of HRD investments and *financial* measures of performance (Bassi and Van Buren, 1998b).

In the current study, we address several secondary questions about this link. For instance, we assess whether some types of investments generate greater returns than others. Specifically, we examine whether investments in certain training content (e.g., technical skills versus basis skills) are connected to organizational performance. We also look at the effects of the relative distribution of training investments between internal and external expenditures (i.e., outsourcing) on performance.

The final question addressed by our study is whether investments in different categories of employees generate greater returns than others. In particular, we look at relative investments in the training of low-skill vs. high-skill, low-wage versus high-wage, and exempt versus non-exempt employees, and how such investments may be connected to organizational performance.

Data and Measures

In 1997, we began an effort to collect information on the nature and extent of employer-provided training and development investments and practices in the United States on an annual basis. The survey focuses primarily on measuring firms' investments in education and training, but also collects data on work practices, compensation policies, and subjective measures of organizational performance. From a random sample of 10,000 establishments, we were able to obtain information on the training and development investments and practices of 500 organizations (for the 1996 calendar year).

In 1998, we repeated the data collection process. Rather than a random sampling technique, we used a variety of convenience samples to increase the sample size from the previous round. The samples included the readership of a leading practitioner-oriented journal in the field of HRD, attendees of a large conference on training and development, and readers of a public website devoted to the field. As a result, the number of respondents in the second increased to 800 organizations from the United States. Only the organizations that provided usable data were included in the analyses (754). These data from 1997 calendar-year investments and practices permit us to take another cross-sectional snapshot of investments in training and development and their connections to firm performance.

A subset of 85 organizations reported data in both rounds. Data from these organizations for the 1996 and 1997 calendar years, respectively, allow us to begin to unravel the direction of the relationship between HRD investments and performance. In particular, we examine the effects between 1996 investments and 1997 organizational performance.

Investments in education and training were measured in a number of ways. We collected three measures the level of training expenditures: total training expenditures, training expenditures as a percent of payroll and training expenditure per employee. We also measured investments in terms of the percent of employees trained each year.

In addition to point estimates of these investments, we include several change measures in our analyses. First, we use estimates respondents to the second round reported to us of the percent change in these investments from the previous year. (We subsequently refer to these as "reported" change measures.) Then, using data from the 85 organizations that reported in both rounds, we calculated measures of the actual change in expenditures from 1996 to 1997. (We subsequently refer to these as "calculated" change measures. They are used only in our longitudinal analyses.)

Finally, our data on investments included measures of the percent of training expenditures going to outside providers and the distribution of training expenditures across more than a dozen course types. For the latter, we do not have change measures because of a change in which these data were collected between the two rounds. For the former, however, we include both reported and calculated change measures in the analyses.

The outcome measures used for the analyses in this report were self-reported measures of perceived organizational performance. Respondents were asked to assess whether their organization's performance in 1997 was: (1) better, worse, or no different from 1996, and (2) better, worse, or no different from other organizations that do the same kind of work. Within each of these two categories, respondents were asked to assess five specific aspects of performance, including: ability to retain essential employees, employee satisfaction, quality of product/services, customer satisfaction, and overall profitability. Factor analyses of these performance measures were used to construct two corresponding indices of organizational performance (one for change in performance between 1996 and 1997, and the other for the level of performance in 1997 versus peer organizations)

In addition to measures of investments and performance, our data allowed us to control for the presence of a number of other factors that could potentially affect performance. We assess the extent to which the organizations

used: (a) high performance work practices such as employee involvement with management in business decisions, employee access to key business information, and self-directed work teams; (b) training practices such as train-the-trainer programs, line-on-loan or rotational training staff, training resource center, mentoring or coaching practices, individual development plans, peer review of performance/360 feedback, and training information systems; and (c) innovative compensation practices, including profit sharing or gain sharing, group or team-based compensation, individual incentive compensation, and employee stock ownership plans.

Research Results

We performed two primary sets of analyses: cross-sectional and longitudinal. We focus first on the cross-sectional results from the 754 respondents to the second round.

Cross-Sectional Analysis

For our cross-sectional analysis, we ran correlations to examine the zero-order relationships between measures of investments in training and other human resource practices in 1997, and our measures of performance in 1997. Table 1 reports the significant Pearson correlations we uncovered.

Table 1

Cross-Sectional Correlations, 1997 Data

	Performance Versus Others 1997	Change in Performance 1997
% of Employees Trained 1997	.140**	–
Reported Change in Training Expenditures 1996-7	–	.095*
Reported Change in % of Employees Trained 1996-7	–	.159**
High Performance Work Practices Scale 1997	.191**	.148**
Innovative Compensation Practices Scale 1997	.081*	–
Innovative Training Practices Scale 1997	.104**	–

* $p < .05$; ** $p < .01$.

As we found in our analyses of the first round of data, organizations that trained a higher percentage of employees in 1997 reported a higher level of performance versus peers (Bassi and Van Buren, 1998b). None of the three monetary measures of training investment, however, were correlated with the level of performance. Also, as we witnessed with the first round data, changes in performance were positively correlated with changes in total training expenditures and changes in the percentage of employees receiving training.

These results are consistent with *a priori* expectations. The *level* of training should be expected to be correlated with the *level* of performance, but not the change in performance. Similarly, *a change* in training investments should be expected to be correlated with *a change* in performance, but not with the level of performance.

There are also significant, positive correlations between both measures of overall performance and companies' use of high performance work practices. The use of innovative training practices and compensation practices were only associated with change in overall performance from 1996 to 1997.

The results in Table 1 are also notable for what is missing. None of the measures of investments by course type or by internal versus external were associated with either measure of overall performance. Likewise, the extent to which expenditures are allocated to the training of non-exempt, low-skill, or low-wage employees appears to have no relationship with performance.

Longitudinal Analysis

The longitudinal analyses help us determine whether the relationships we find with the cross-sectional data are spurious or real. Before conducting our longitudinal analyses, we assessed whether firms that reported data for both rounds were meaningfully different from those that reported only in the second round. A logistic regression (with participation in the both rounds as the dependent variable) revealed no significant predictors of participation with the exception of industry. (Results not shown.) Repeat participants were more likely to be located in the Finance/Insurance/Real Estate sector and less likely to come from the Services sector.

First, we examined zero-order correlations between 1996 investments and 1997 performance to see what impact a one-year lag between investments and performance has on the bivariate relationships found in the cross-sectional analysis. Columns 1 and 2 of Table 2 display the Pearson correlation coefficients that were significant. The results display the same general pattern that we observed with the cross-sectional data. That is, the level of investment was associated with the level of performance and the change in investment was associated with the change in performance.

Table 2

Longitudinal Correlations

	1 Performance Versus Others 1997	2 Change in Performance 1996-97	3 Performance Versus Others 1996	4 Change in Performance 1995-96
Training Expenditure Per Employee 1996	.367**	–	.290**	–
Training as % of Payroll 1996	.285*	–	.181	–
Innovative Training Practices Scale 1996	.298**	–	.460**	.484**
Computed Change in Training Expenditures 1996-97	–	.313**	–	N/A
Computed Change in Expenditures per Employee 1996-97	–	.298**	–	N/A
Reported Change in % of Employees Trained 1996-97	–	.296**	–	.063
Orientation Training 1996	-.226*	–	-.049	–

+ < p 10; * p < .05; ** p<.01.

The exact measures that exhibited significant relationships with performance, however, were slightly different. Unlike the cross-sectional analysis, monetary measures of investment were clearly associated both the subsequent level of and change in performance. In other words, organizations that made heavy investments in training in 1996 reported substantially greater improvements in overall performance in 1997 as well as a significantly higher level of overall performance in 1997.

The use of innovative training practices also continued to be a significant correlate, while the use of high performance work practices and innovative compensation practices were not significantly related to performance. One possible interpretation is that the latter types of practices have impacts on performance over a different time frame, either shorter or longer. Other studies of these types of practices have shown strong evidence of their impact on organizational performance (Arthur, 1994; Huselid, 1995; MacDuffie, 1995)

We also find that computed changes in expenditures were significant correlates of change in performance, whereas reported changes were not. It may be that respondents retrospective estimates of these changes were not entirely accurate. On the other hand, respondents' reported changes (but not computed changes) in the percent of employees trained—perhaps an easier measure to for respondents to estimate accurately—remained significant.

Much like the cross-sectional results we found very little evidence that where organizations place their human capital investments affects performance. The only exception was that firms that spent more on new employee orientation training in 1996 tended to report lower performance versus peers in 1997. It may be a statistical anomaly or it is possible that such organizations experienced a large influx of new employees without much previous work experience, the effect of which was a slight drop in performance while they became fully functional.

Columns 3 and 4 of Table 2 shed further light on the causal direction of these relationships. These columns provide the comparable correlation coefficients for our longitudinal panel between 1996 investments and 1996 performance. With the exception of the use of innovative training practices, 1996 investment measures were more strongly related to *1997* performance than 1996 performance. This finding suggests that 1996 human capital investments were more likely to be determinants of 1997 performance than co-determined with 1996 performance.

To more precisely assess the strength of these relationships, we performed several Ordinary Least Squares regressions of firm performance in 1997 on human capital investments in 1996. Table 3 displays the results of these regressions. Only predictors with significant coefficients are displayed. We also included controls for industry sector and size of organization.

Table 3

Regressions of 1997 Performance on 1996 Investments[a]

	1 Performance Versus Others 1997	2 Performance Versus Others 1997	3 Change in Performance 1996-97	4 Change in Performance 1996-97
Training Expenditures per Employee 1996	.279*	.144	–	–
Innovative Training Practices Scale 1996	.278*	.039	–	–
Performance Versus Others 1996	–	.503**	–	–
Computed Change in Training Expenditures 1996-97	–	–	.309**	.201+
Change in Performance 1995-96	–	–	–	.393**
Adjusted R-Square	.166	.319	.074	.191
F	5.720**	7.925**	3.989*	6.502**

+ $p < .10$; * $p < .05$; ** $p \leq .01$.

[a]Standardized coefficients shown.

The results in columns 1 and 3 of Table 3 reveal that 1996 investments were key predictors of 1997 performance even with appropriate controls. Because of the high level of collinearity among investment measures we dropped all but the strongest predictors of performance from the analyses. In addition, we find that the use of innovative training practices in 1996 remained highly related to the level of performance in 1997. This suggests that it matters not only how much firms spend on training, but also how they apply those expenditures.

Columns 2 and 4 repeat the regressions but with a control for the first round level of, or change in, performance. These regressions illustrate a great deal of endogeneity. Performance at time 1 is a much stronger predictor of performance at time 2 than investments in training at time 1. This is not surprising as serial correlation of performance measures is not uncommon. Furthermore, the training investment measures only account for a small part of the total variation in performance (7 to 17 percent).

As a final step in our analyses, we examined the nature of the relationship between training investments and firm performance more closely. Figure 1 displays two sets of correlations: 1) correlations between 1996 investments

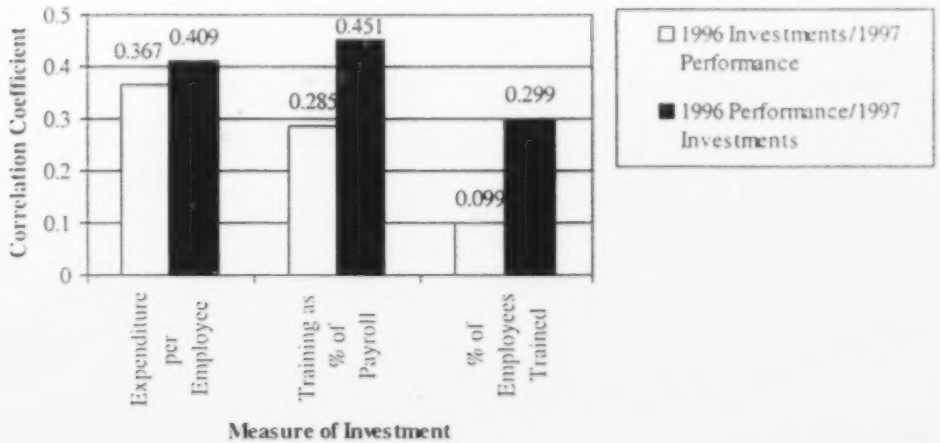
and 1997 performance, and 2) correlations between 1996 performance and 1997 investments. Although two of the three correlations in the former were significant, all three coefficients were smaller than the coefficients in the latter. That is, 1996 performance tended to be a stronger correlate of 1997 training investments, than 1996 training investments were of 1997 performance.

This evidence suggests that, with only two years of data, we are unable to rule out several possibilities. First, performance may be a leading indicator of training expenditures, and not visa versa. Second, and more likely, the link between firm performance and training expenditures may go both ways. High performance leads to greater investments in the training in the following year, which in turn leads to higher performance the next year. In other words, a set of mutually-reinforcing relationships is at work.

Summary

The results of our analyses are highly encouraging. Not only do our cross-sectional data analyses reinforce the association we uncovered previously between training investments and organizational performance, but our longitudinal analyses reveal an especially strong connection between investments in one period and performance in the next period. Furthermore, we find that this relationship holds even when a number of contextual factors are held constant. However, we find relatively little indication that where those dollars are allocated has a significant impact on performance. Rather, it is ensuring a level of spending that benefits everyone that has the strongest effect on organizational-level performance.

Figure 1: Direction of Relationships



Our results, however, must remain tentative as there are also indications that a one-year period may not be the appropriate lag between training investments and firm performance. We find evidence, that the relationship between investments is not unidirectional, and may actually be best portrayed as a set of cumulative, mutually reinforcing effects over time. With each subsequent year of data collection, we intend to examine the length of this lag and the direction of the effects more precisely and definitively.

Ascertaining the link between investments in HRD and firm performance is a difficult, but not necessarily impossible task. Only by doing so will HRD practitioners be able to determine which investments have high payoffs and should be continued, and which have poor results and should either be revised or eliminated. Unfortunately, currently most organizations know very little about what they receive from those investments or how to make those investments wisely. Nor do many organizations have the luxury to experiment with different allocations of their investments to determine for themselves which investments are most productive. Our research provides HRD practitioners with the empirical foundation to demonstrate to others in their organizations that higher levels of wisely-placed investments in HRD will provide valuable results to their organizations—not only in terms of employee learning and development, but also as seen in their bottom lines.

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Contemporary Approaches to Return on Investment from Training

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This paper investigates several approaches that are often used to estimate return on investment (ROI) for training enterprises. It describes various methods of assessing behavior change and the value of that change, and also describes several methods of calculating and using ROI. Some of these methods are benefit/cost ratio, return on investment, the time value of money, formula driven analysis, benefit forecasting, the relative aggregate scores approach, the Stolovitch/Maurice Model and others

Keywords: Return on Investment, Training, Evaluation

Trainers are often plagued by the lack of simple and effective methods for showing the benefits of training. They often resort to "smile sheets" or just assume that if the training is based on a needs analysis it probably is effective. However, these methods cannot tie training activities to the dollar values considered important by most organizations. This puts trainers at a disadvantage when dealing with their more financially literate colleagues. The "bean-counters" in the organization are likely to know exactly how much training "costs" but they may have little idea of its value. We must be able to supply that information.

Several methods have been used to try to show the monetary benefits of training. Some look at the consequences of not training. Others involve analyzing performance records, or costing the training curve under training and non-training conditions. Probably the best known method is cost/benefit analysis. Usually a lengthy and tiresome process, cost/benefit analysis calculates training costs, assesses some performance value that occurred as a result of training, and computes an index of benefits. Performance values are derived from productivity measures such as the number of items produced per shift. If more items are produced after training, the "gain" can be calculated by subtracting training cost to show benefit. However, there seems to be no universally accepted method of doing this. Whichever methods are used to calculate the benefit of training, they are probably tacit admissions that performance improvement efforts are big business and the improvements they make ---or don't make---should be considered seriously.

According to a June 1996 article in *Across the Board* magazine, "American business invested an estimated $30 billion in training in 1996" (Bachler, 1997, p. 98). Bassi (1996) Reported even larger totals for 1995, indicating that employers' total expenditures on training were $55.3 billion. Whichever number you believe, it seems clear that training and development efforts are big business in America. In light of these large expenditures, managers of both private and public organizations are beginning to more seriously question their return on investment in training. Holton (1995) believed that "increasing global competition has led to intense pressure on HRD to demonstrate that programs are directly contributing to the 'bottom-line' of the organization". Phillips, (1995) said, "in any direction one chooses to take in the HRD field, the pressure to measure the return on investment (ROI) is increasing". Employers "especially want to know what benefits they can expect from it" (Dionne, 1996, p.280). They want to analyze the financial costs and benefits of human resource development (HRD) programs" (Parsons, 1995, 17-4). Of the estimated $30 billion (or $52.5 billion) invested in training, are there benchmarks that indicate how much is wasted on inefficient training? The answer to this question is dependent upon another: "What does management want from its training investment and can management's expectations be met in other than traditional bottom-line terms?" (Blickstein, 1996). This manuscript seeks to identify and describe relatively recent "state-of-the-art"approaches to showing the benefits of training. It focuses on various approaches to return on investment (ROI) and describes a number of ways to analyze the costs and benefits of training.

Kirkpatrick's Model

A brief review of, and comment upon, Kirkpatrick's four-level evaluation system is useful. In 1959, while teaching at the University of Wisconsin, Kirkpatrick proposed a model that classified training outcomes into four levels. The model was developed to "clarify the elusive term 'evaluation'"(Brown and Seidner, 1998, p.95). These often-cited levels describe a rubric that is often used to evaluate programs. The first level is the *reaction* level. Reaction may be

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described as how well the trainees like a particular program (Kirkpatrick, 1996). This level can be called a measure of customer satisfaction. Evaluations at this level measure how those who participate in the program react to it. "If training is going to be effective, it is important that trainees react favorably to it. Otherwise, they will not be motivated to learn" (Brown and Seidner, 1998, p.10). The second level of the model is *learning* evaluation. It "can be described as the extent to which participants change attitudes, improve knowledge, and/or increase skill as a result of attending the program" (Brown and Seidner, 1998, p.101). Pine and Tingley (1993) defined level 2 evaluation in terms of measuring the content of the training. The third level is behavior. Behavior can be defined as the extent to which behavior is changed by a training intervention. The final level, results, can be defined as the effect of the training intervention on the bottom line of the enterprise. Results is usually described as a return-on-investment calculation that shows the dollar value of the benefits of training over the cost of the training. Results analysis can include increased production, improved quality, decreased costs, reduced frequency and/or severity of accidents, increased sales, reduced turnover, and higher profits and return on investment (Parry, 1976, p.74). Kirkpatrick is quoted as stating: "It has long been thought important to recognize that the most desirable approaches to delivering instruction (training) are those that are the most effective in terms of results and the most efficient in terms of cost" (Parry, 1976, p.74). Blank, (1982) agreed. He believed that "we need to strike a balance between effectiveness (does it work?) and efficiency (how much does it cost?)" (p.192). What we want to do, then, is to consider costs versus benefits at the results level of evaluation. But where do we start?

Measuring the Change in Behavior

The first thing that must be done is to measure somehow the change in behavior we think the training intervention has produced. Several methods have been proposed to do this.

360-Degree Appraisal Feedback Process

Antonioni (1996) defined 360-degree feedback as a process whereby "individuals appraise themselves and also receive appraisal feedback from their appraisers; immediate supervisor, peers, and from direct contributors if they are managers" (p. 72). Charney and Conway (1998, p. 196) defined 360 degree feedback as "a performance evaluation system that uses input from all employee levels to assess performance. Training is an important factor in helping employees use the process effectively". An effective 360-degree feedback process "offers a major opportunity for organizational members to improve the quality of their work relationships, helps appraisers and appraises effectively define the quality requirements in their work relationships, teaches individuals how to give and receive constructive feedback, and provides a structure for discussing the undiscussables" (Antonioni, 1996, p. 79). An effective 360-degree feedback process not only improves work behaviors, but increases worker performance which in turn, improves return on investment for the organization. In this way, it can be a method for helping to describe the benefits of training.

Performance-Learning-Satisfaction Evaluation System

This evaluation model embraces the domains of performance, learning, and satisfaction. "The *PLS Evaluation System* purports to be a rigorous, yet flexible, evaluation system. It is flexible enough to accommodate almost all situations. It is rigorous enough to consistently honor core questions, techniques, and reporting results as part of every evaluation. In addition to the *PLS Evaluation system* conceptual components, job aids, tools, and references, there is an auxiliary data processing system consisting of a computer, software, a data scanner, and a printer" (Swanson and McClernon, 1996, p. 719). "Performance can be thought of as (a) business results at the organizational, process or individual levels and/or)b) financial results or benefits in terms of money or monetary ratios. Most, but not all, business results can be monatized and turned into financial results" (Swanson and McClernon, 1996, 719). According to Swanson and McClernon, the general financial results goal of the model is to have benefits exceed the costs by a 2:1 ratio. "If the 2:1 return on investment goal is achieved, it can be said that the program achieved 100% of its goal" (Swanson and McClernon, 1996, 719).

The Balanced Scorecard

"The financial- and strategic-planning world is starting to look seriously at a performance measure called the balanced scorecard" (Willyerd, 1997, p. 53). This method tracks the key elements of a company's strategy using both financial and operational measures. "Building a scorecard enables a company to link its financial budgets with its strategic goals" (Kaplan and Norton, 1996, p. 78). The balanced scorecard looks at four key areas of performance and provides answers to the following questions: "(1) How do we look to our shareholders? (Financial perspective.); (2) How do customers see us? (Customer perspective.); (3) What must we excel at? (Internal perspective.); and (4) Can we continue to improve and create value? (Innovation and learning perspective.)" (Willyerd, 1997, p. 53).

This approach helps ensure that all the critical performance measures are evaluated in addition to return on investment issues. "It provides a check and balance so that one area isn't overemphasized at the expense of another" (Willyerd, 1997, p. 53).

Current Status of ROI

Return on investment has been a critical issue for trainers and top executives in recent years and one listed on meeting agendas and discussed in the literature." (Phillips, 1996, p.42). On one hand, "some professionals argue that it is not possible to calculate the ROI in HRD, while others quietly and deliberately proceed to develop measures and ROI calculations" (Phillips, 1997). This leads us to question of what *is* the current status of ROI in the field of performance improvement?

Even that is not really clear. "Currently, it's difficult to pinpoint the state of ROI within the field" (Phillips, 1996, 42). Some HR managers are reluctant to discuss internal practices and it is difficult to find case studies that specifically list the strategies used by training departments in determining ROI. However, a recent study of more than 40 organizations found that the best companies are measuring customer requirements, testing participants, measuring what the client can and will pay for, and moving away from justification (Dixon, 1996, p.82). Dixon stated, (p.84),"One of the most striking findings of this study was that none of the best practice organizations was evaluating primarily to justify training or to maintain the training budget". In addition, the study found that "all the best-practice companies were conducting Level 3 and 4 evaluations selectively rather than consistently"(p. 84). Geber (1995) was consistent with Dixon and believed that "with all the effort that's involved, it would be impractical for most companies to do level 3 and level 4 evaluations on every single course". (p.30).

Calculating ROI

Calculating ROI is not so simple, either. Consider Phillips (1996, 44) "Organizations calculating ROI for the first time should select only one course to measure". It is not practical for most organizations to calculate the ROI on all training programs because the result would be too many calculations and too time-consuming. "Most organizations, for the sake of practicality, decide to evaluate just one or two of their most popular training programs". The respondents participating in Phillips" study were not just content to show that training can result in such improvements as increased productivity and decreased turnover. An additional step was taken to convert these improvements to monetary values that could be compared to costs for a ROI calculation. For hard-data items, such as productivity, quality, and time, the ROI calculation was easier than those calculations for soft-data items, such as customer satisfaction, employee turnover, and job satisfaction (Phillips, 1966). But consider that he also said, "One approach to ROI is to add a fifth level to the four-level evaluation developed by Donald Kirkpatrick" (1996, 42). In addition to the reaction level, learning level, behavior level, and the results level, a return on investment level is added that compares the training's monetary benefits with the costs. A model has been developed that "tracks the steps in measuring ROI — from collecting post-program data to calculating the actual return" (Phillips, 1996, 43). The model can compare training costs to monetary benefits, assuming that all training programs have reportable results as well as intangible benefits.

Basic Model For Calculating ROI

The basic paradigm for calculating ROI is as follows: "Collect level-4 evaluation data. Ask the question "Did on-the-job application produce measurable results?" Isolate the effects of training from other factors that may have contributed to the results. Convert the results to monetary benefits. Total the costs of training. Compare the

monetary benefits with the costs" (Phillips, 1996, 20). Several approaches currently being used to calculate return on investment by individuals and organizations. The following sections will identify and discuss some of these approaches.

Benefit/Cost Ratio and Return on Investment

Two common formulas used to calculate ROI, according to Phillips, are benefit/cost ratio (BCR) and the return on investment (ROI). "To find the BCR, you divide the total benefits by the cost. In the ROI formula, the costs are subtracted from the total benefits to produce the net benefits, which are then divided by the costs" (Phillips, 1996, 43). "For example, if a training program produces benefits of $321,600 with a cost of $38,233. The BCR is 8.4. For every $1 invested, $8.4 in benefits were returned. The net benefits are $321,600 - $38,233 = $283,367. ROI is $283,367 / $38,233 = 741 percent. Using the ROI formula, for every $1 invested in the program, there was a return of $7.4 in net benefits."(Phillips, 1996, 43).

"Compact" Cost-Benefit Analysis

This method measures job performance after training and is based upon a method used by Godkewitsch (1987) that was later published by ASTD in INFO-LINE publication # 007, entitled "How to Conduct a Cost-Benefit Analysis" (1990). Brauchle (1995) described this as a "compact method" because it uses a formula, not a spread sheet, to calculate ROI. The result is a dollar amount that describes what the training is worth to the organization in terms of the performance of the workers who have participated in the training" (Brauchle, 1995, 17-2). The following five steps are calculated to determine the benefits of training using this method: "(1) Determine the effect of the training; (2) Determine the dollar value of the effect; (3) Find out how many people have been trained; (4) Determine the training cost per person; and (5) Put the information together in the formula and turn the crank." (Brauchle, 1995, 17-2).

There are advantages and disadvantages concerning the use of this method, which seems to be unique in that it assesses the improvement of trainees in standard deviation units and uses as a rule of thumb a 40% increase in performance value for each standard deviation of improvement. The advantages of this method are several: (1) It uses dollars as the unit of measure for the analysis. This unit of measurement is usually acceptable to managers because they understand it; (2) The method is relatively simple to use; (3) It does not require extensive computer capability or number crunching power; and (4) It provides results fairly quickly (you don't have to wait for a one-year budget report). However, it suffers because "(1) It is a norm referenced method, with several attendant problems: (2) It relies on supervisor evaluations which may be of doubtful validity and even more questionable reliability: (3) The value of one standard deviation improvement (40 percent of annual salary, based on other studies) is questionable and should not be used if you have local benchmarks against which to compare it: (4) The dollars calculated as benefits are not real dollars unless you have your own validated benchmarks: (5) It may be difficult to tie the benefits to long term business results if the measures of productivity gain are taken shortly after training: and (6) The results do not answer the question 'Did you train for the RIGHT skills?' ". This method is "...probably worth using if you can establish your own benchmarks for the value of one standard deviation of productivity gain. (It) is less complicated than many others and may provide useful justifications for the training enterprise" (Brauchle, 1995, 17-2).

HRD Benefit-Forecasting Model

"The basic HRD benefit-forecasting model includes methods for determining monetary values for the following components: (1) the performance value to result from the HRD program, (2) the cost of the HRD program, and (3) the benefit resulting from the HRD program" (Swanson and Gradous, 1988, 21). The model, according to Swanson and Gradous, defines benefits as performance value minus cost. "Performance value is the financial worth of the number of performance units that result from an HRD program" (Swanson and Gradous, 1988, 31). This is calculated by multiplying the total number of units expected to result from the program times the dollar amount of one unit. "Cost," according to Swanson and Gradous, is "an item of outlay that is incurred in the operation of HRD programs." These costs may include such items as direct and indirect costs, fixed and variable costs, and amortization. "An HRD cost is any expenditure that the organization chooses to attribute to an HRD programs. What is an HRD cost in one organization may not necessarily be considered an HRD cost is another" (Swanson and Gradous, 1988, p. 91).

The Relative-Aggregate-Scores Approach

This approach, like the time-value-of-money method discussed above, is borrowed from production operations management (POM). As described by (Gaither, 1996, p. 265), this approach might help compare alternative locations for a production facility. We can use it to compare the relative value of training for different tasks or duties within a job, and for assessing the gain in value for that job after training. When we use it to assess the benefits of training (Brauchle, 1992), the difficulty, importance, and frequency of various job tasks is assessed. For each of these, weights are derived. Then, actual performance data are used to show a value for each task, performance value before and after training, and a performance gain for each task, as well as for the job as a whole. The results of this approach can be used to monitor the results of training and also to plan training so limited resources are invested in the most important areas.

Stolovitch/Maurice Model

This model is a combination of numerous ROI models and "draws primarily from the work of Schneider and Wright (1990), Schneider, Monetta and Wright (1992), Robinson (1990), Robinson an Robinson (1989), Spencer (1984), and Stolovitch and Keeps (1995) (Stolovitch & Maurice, 1998, p. 130). It consists of seven steps. *Step 1* Calculate potential for improved performance. A front end analysis is conducted to determine the purpose of the training request, identify the desired and actual performance of training, and identify the appropriate solutions that are relevant, feasible, and acceptable to the organization and the targeted performers. *Step 2* Calculate estimated training costs. These costs include development costs, implementation costs, and maintenance costs. The total cost of all training development, implementation, and maintenance costs is an estimate of the total costs. *Step 3* Calculate the worth analysis. This step verifies the worth of training by comparing the cost of training to potential outcomes. First, estimate the highest number and the lowest number of annual deficiencies or improvements. Second, estimate the high and low cost of each deficiency or improvement. Third, calculate the current annual cost of both the high and low deficiencies or improvements. Fourth, estimate the range of expected deficiencies corrected or improvements obtained from training. Fifth, estimate the high and low annual value of training. Sixth, multiply the high and low annual amounts of training by the length of time the training will last and divide the estimated training costs to obtain the potential worth of the training efffort. *Step 4.* This step includes design, development, implementation, support, and monitoring/evaluation of training. *Step 5.* Calculate the true costs of training. This step is similar to step 2, but new actual figures are used in place of estimated values. *Step 6.* Calculate the organizational ROI. This step involves estimating the percentage of impact likely due from training and calculating the value of results against training costs only on projects where training has been the major performance intervention. *Step 7.* Calculate individual increased value of human capital.

Critical Outcome Technique

"This technique was developed as a means of assessing program effectiveness in a systematic, post-hoc manner" (Mattson, Quartana, and Swnson, 1998, p. 45). The process model contains five steps that make up the model. Outcome definition is the first step in the model and the key question here is "What are we trying to do?" The second step is outcome inquiry and involves identifying the actual outcomes of the program. Outcome verification is the next step in the process. "Did the outcomes really occur as reported by the participant?" and "Would the outcomes have occurred without the program?" are questions asked during this phase of the process. The fourth step is outcome valuation and the primary question is,"How much are these outcomes worth?" The fifth and last step is outcome report. This step summarizes the outcomes in an abbreviated and narrative forms.

Core Financial Analysis Method

"This model and method for analyzing actual and forecasted financial benefits are relatively simple and straight forward" (Swanson, 1998, p. 60). The basic model is comprised of three components that consist of the performance value resulting from the training program, the cost of the training program, and the benefit resulting from the training program. The training benefits are calculated by subtracting the cost of the training program from the performance value of the program. Swanson and Gradous have developed detailed instruction worksheets that explain this model in more detail.

Other Factors to Consider

After benefits have been calculated, we may think the job is done, but two things still need to be considered.

Isolating the Effects of Training

Most of the time, improvements in job-performance are only partially due to training programs. Variables other than the training, such as the trainees' age and work experience, seasonal sales patterns, economic changes, shifts in managerial styles, equipment breakdowns, customer attitudes, etc. may influence the data making it difficult to determine the actual effect of the training upon the ROI results (Shelton and Alliger, 1993). "One way to measure the effects of extraneous factors is to compare the results of a control group with the results of the trainee group" (Shelton and Alliger, 1993, 44). "The experimental group receives training; the control group does not" (Phillips, 1996, 30). Trend-line analysis, forecasting, participant estimation, supervisor estimation, management estimation, customer input, expert estimation, subordinate input, and others factors are additional ways to isolate training's effect on performance (Phillips, 1996).

The Time Value of Money

A thorough consideration of a training or performance improvement initiative should also include an appreciation of the time-value of the money that is saved (or made). This concept has been used for years by production operations managers (Riggs, 1987), and considers two different things: the present value of future dollars and the future value of present dollars. For example, if your ROI calculations indicate that after three years your training intervention will have made (or saved) the company $100,000, you would want to know the present value of those future dollars. The general formula for the present value of future money is $P=F/(1+i)^n$ (Riggs, 1987, p. 132). If we plug in the above value and inflation is running at 10% per year, we get $P=100,000/(1+.10)^3$, or $75,131.48. So we can see that the $100,000 that will be saved in the future is not worth nearly so much in present value. In fact, it is worth considerably *less* than the face value. This fact should be taken into consideration when calculating the value of training. For a different kind of example, suppose you know you have to invest the same $100,000 now for a program that will break even in three years. You want to know the future value of those present dollars that you are spending. Riggs (1987, p.132) gives this formula as: $F=(1+i)^n$, which is $F=(1+.10)^3$, which works out to $133,100. If we had not invested those dollars, in three years they would have been worth $133,100, so the value of the training program after three years must exceed $133,100, or we haven't really shown any gain!.

Many HR practitioners believe that the ultimate level of organization, return on investment, shows the true contribution of training. (Phillips, 1996) The process is not complete "until the results have been converted to monetary values and compared with the cost of the program" (Phillips, 1996, p. 20). Four distinct and important benefits can be derived from the implementation of ROI in an organization. (Phillips, 1997) First, return on investment will measure the contribution the program made to the organization and will determine if it was a good investment. Second, this calculation will determine which programs contribute the most to the organization and allow priorities to be established for high-impact training programs. Third, the ROI calculation brings a focus upon the results of all programs, not just those targeted for the financial evaluation. Fourth, this process can help convince management that training is an investment and not an expense. (Phillips, 1997)

Conclusion

"One of the most common criticisms of trainers is that they don't measure the organization's return on investment in training" (Mendosa, 1995, p. 66). Millions of dollars are expended by both public and private organizations to train new employees as well as present employees. However, "The statistics everyone wants, those that would tell us the return on training dollars spent, has proven to be stubbornly elusive" (Fagiano, 1995, p. 12). We have described in this manuscript several models that help organizations evaluate the benefits of training through return-on-investment. These range from Kirkpatrick's four level model to more complex models that are being used to determine the ROI for both public and private organizations. Most HRD professionals agree that "training doesn't cost .--- it pays and that HRD is an investment, not an expense" (Parry, 1996, p. 72). Laird had stated as early as 1985 that "client-managers need measurement as an indication that they're solving or eliminating performance problems . . . getting something back on the training investment" (Laird, 1985, 241). In today's economy with

down-sizing and world-wide global competition among public and private organizations, it is very important to be able to justify training expenses as well as all expenses of these organizations. All these expenses must relate to organizational performance - growth, profit, market share, etc., and they must also contribute to the "bottom-line".

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